REMARKS

The applicants amend claim 4 by adding the words "hydrogen rich gaseous or" and deleting the words "for heating or transportation." This amendment finds support on page 12 in the second paragraph. Further, the applicants amend claim 15 to correct an obvious typographical error by deleting the word "bag" and adding in its place the word "slag." Claims 1-39 are currently pending in the subject application.

The applicants amend the paragraph of the specification that starts on page 9 and ends on page 10 to correct an obvious typographical error by deleting the word "combination" and adding in its place the word "combustion."

Favorable consideration of the application as amended is respectfully requested.

Respectfully submitted,

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (Original) A method for producing clean energy from coal comprising:

feeding coal into a chamber which is sealed to the atmosphere and which possesses a charging end and a discharging end;

moving the coal within said chamber towards the discharging end;

injecting oxygen which is essentially pure in such a way as to combust a portion of the coal while maintaining a pressurized reducing atmosphere to:

(i) cause the release of high levels of thermal energy to devolatilize the coal; and

(ii) yield a pressurized hydrogen rich raw gas containing coal-derived cancer causing distillates and hydrocarbons together with a hot char;

cracking the coal-derived cancer causing distillates and hydrocarbons contained in the hydrogen rich raw gas to make a hydrogen rich cracked gas which after desulfurization becomes a clean hydrogen rich synthesis gas;

directing the hot char to a gasifier which is sealed to the atmosphere;

gasifying the hot char with air in said gasifier to yield a raw fuel gas and a molten slag;

flowing the raw fuel gas together with the molten slag through a common port out of said gasifier to maintain said port open for the free flow of the raw fuel gas and the

molten slag;

separating the raw fuel gas from the molten slag after exiting from said common port;

directing the raw fuel gas to a cleanup system to clean it and thus yield a clean fuel gas suitable for combustion with low NO_x formation; and

quenching the molten slag to convert it to a non-leaching solid.

Claim 2. (Original) The method set forth in claim 1 further comprising the synthesizing of said clean hydrogen rich synthesis gas into a liquid fuel or chemical.

Claim 3. (Original) The method set forth in claim 1 further comprising the utilizing of said clean fuel gas for the generation of electric power.

Claim 4. (Currently amended) The method set forth in claim 1 wherein the step of gasifying the hot char with air in said gasifier to yield a raw fuel gas is further characterized by the step of substituting the air with essentially pure oxygen and steam in order to make a hydrogen rich raw gas instead of a fuel gas from the char, which after cleanup, a clean synthesis gas is obtained which can be synthesized into a hydrogen rich gaseous or liquid fuel ~~for heating or transportation~~.

Claim 5. (Original) The method set forth in claim 1 wherein the step of injecting oxygen which is essentially pure in such a way as to combust a portion of the coal is further characterized by the step of substituting air for the pure oxygen in order to make a raw fuel gas which after cleanup, a clean fuel gas is obtained which can be utilized for heating or electric power generation.

Claim 6. (Original) The method set forth in claim 1 includes the using of preheated air.

Claim 7. (Original) The method set forth in claim 1 includes the using of oxygen enriched air.

Claim 8. (Original) The method set forth in claim 1 wherein the step of gasifying the hot char with air in said gasifier comprises the injection of the air in the downdraft mode.

Claim 9. (Original) The method set forth in claim 8 further comprising the injection of the air at a plurality of penetrations into said gasifier.

Claim 10. (Original) The method set forth in claim 1 includes the step of compacting the coal against the wall of the chamber at the charging end to such an extent as to densify the coal to essentially make it impervious to gas flow at the charging end in order to force pressurized raw gases generated during the heating of the coal to flow out of the discharging end of said chamber;

Claim 11. (Original) The method set forth in claim 1 wherein the step of flowing the raw fuel gas together with the molten slag through a common port of said gasifier includes the step of providing supplementary thermal energy to prevent solidification of the molten slag in said port.

Claim 12. (Original) The method set forth in claim 11 includes the step of providing oxidant injection means to combust a portion of said raw fuel gas to create said supplementary thermal energy.

Claim 13. (Original) The method set forth in claim 11 wherein said supplementary thermal energy is derived from electric induction means.

Claim 14. (Original) The method set forth in claim 1 wherein the step of flowing the raw fuel gas together with the molten slag through a common port out of said gasifier includes the collecting of the molten slag in a receiver to serve as a molten bath.

Claim 15. (Currently amended) The method set forth in claim 14 includes the step of directing the raw fuel gas together with the molten slag to the receiver in a submerged fashion to cause the raw fuel gas to bubble through said molten bath in order to separate the entrained slag from the raw fuel gas and to essentially scrub the fuel gas by making use of the molten ~~bag~~ slag in said receiver.

Claim 16. (Original) The method set forth in claim 14 includes the step of providing a gas exit

port above the bath for the discharge of the scrubbed fuel gas.

Claim 17. (Original) The method set forth in claim 14 includes the step of providing a spillway for the molten slag to flow out of said receiver.

Claim 18. (Original) The method set forth in claim 17 includes the step of providing downstream of said spillway a water quenching chamber to cool the molten slag to a non-leaching solid.

Claim 19. (Original) The method set forth in claim 1 wherein the method is conducted under pressure.

Claim 20. (Original) The method set forth in claim 1 wherein the step of injecting oxygen which is essentially pure in such a way as to combust a portion of the coal is further characterized by the step of injecting the oxygen from a compartment located downstream of the discharging end of said chamber.

Claim 21. (Original) The method set forth in claim 20 further comprising a hot radiant zone disposed to said compartment to reflect intense thermal energy against the coal in the discharging end of said chamber to expedite devolatilization of the coal and crack coal distillates and hydrocarbons which are cancer causing.

Claim 22. (Original) The method set forth in claim 1 including the passing of hot gases through flues disposed in the wall of said chamber.

Claim 23. (Original) The method set forth in claim 1 wherein the step of moving the coal within the chamber towards the discharging end is further characterized by moving the coal progressively with pauses in order to create successive new frontal faces of coal at the discharging end of said chamber for the efficient exposure of the coal to radiant heat.

Claim 24. (Original) The method set forth in claim 1 being further characterized by balancing the pressure between the step of injecting oxygen to combust a portion of the coal and the step of gasifying the char with air so as to essentially prevent the contamination of the hydrogen rich gas by the fuel gas.

Claim 25. (Original) The method set forth in claim 14 includes the step of heating the receiver.

Claim 26. (Original) The method set forth in claim 25 wherein the heating of the receiver is derived from electric induction means.

Claim 27. (Original) The method set forth in claim 1 further comprising the injection of oxygen which is essentially pure in such a way as to combust a portion of the coal at a plurality of points to more efficiently combust coal while maintaining a reducing atmosphere.

Claim 28. (Original) The method set forth in claim 1 wherein an oxidant is added to raise the temperature of the hydrogen rich cracked gas prior to its desulfurization.

Claim 29. (Original) The method set forth in claim 1 wherein an oxidant is added to raise the temperature of the fuel gas prior to its desulfurization.

Claim 30. (Original) The method set forth in claim 28 includes the desulfurization in a cleanup system which is regenerative.

Claim 31. (Original) The method set forth in claim 29 includes the desulfurization in a cleanup system which is regenerative.

Claim 32. (Original) The method set forth in claim 1 further includes the tapering of the reactor chamber in such a way as to diverge towards the discharging end to facilitate the movement of the coal within the chamber.

Claim 33. (Original) The method set forth in claim 1 includes the passing of gases in flues

provided to the chamber of said reactor.

Claim 34. (Original) The method set forth in claim 1 includes the addition of biomass to the coal for processing them in unison.

Claim 35. (Original) The method set forth in claim 1 includes the addition of waste to the coal for processing them in unison.

Claim 36. (Original) The method set forth in claim 1 wherein the step of gasifying the hot char is obviated to limit the conversion of the coal to a coke or a char.

Claim 37. (Original) The method set forth in claim 36 wherein the coke or char are converted to activated carbon.

Claim 38. (Original) The method set forth in claim 1 being further characterized by balancing the pressures between the step of injecting oxygen and the step of gasifying the char, and the step of gasifying the char and the quenching of the molten slag in order to control the various flows of the gases in the process.

Claim 39. (Previously presented) A method for producing clean energy from coal comprising:

feeding coal into a chamber which is sealed to the atmosphere and which possesses a charging end and a discharging end;

moving the coal within said chamber towards the discharging end;

injecting oxygen in such a way as to combust a portion of the coal while maintaining a pressurized reducing atmosphere to:

(i) cause the release of high levels of thermal energy to devolatilize the coal; and

(ii) yield a pressurized hydrogen rich raw gas containing coal-derived cancer causing distillates and hydrocarbons together with a hot char;

directing the pressurized hydrogen rich raw gas in such a way as to emerge from the discharging end of said chamber;

cracking the coal-derived cancer causing distillates and hydrocarbons contained in the hydrogen rich raw gas to make a first hydrogen rich cracked gas;

directing the hot char to a slagging gasifier which is sealed to the atmosphere and gasifying same to make a second gas and a molten slag;

removing said slag from the system; and

cleaning said first gas and said second gas to provide clean gases for useful applications.

Amendment to the Specification:

Please replace the paragraph starting on page 9 and ending on page 10 with the following paragraph:

Reference is now made to Figure 1, which configuration relates to co-production. Coal is fed from bunker 19 into drier 14 thence to lockhopper 16 via surge hopper 15. The coal may have other material(s) with it such as biomass and/or waste to be processed with the coal. Once lockhopper 16 is full, it is locked and feeder 17 controls coal from lockhopper 16 into charging end 34. Coal charger 18 force feeds the coal into reactor 10 in such a way as to compact the coal and make it dense and essentially impervious to gas flow at the charging end to force pressurized raw gases generated during the ~~combination~~ combustion of a portion of the coal, to flow co-current with the movement of the coal in reactor 10 and towards discharging end of reactor 10. Assuming that start-up burner 20 has ignited the coal at the discharging end of reactor 10 and the process is already at steady state the coal is advanced in reactor 10 while oxygen (and possibly steam) are injected via lance(s) 40 into the coal preferably from cracking compartment 21 to devolatilize the coal and produce a raw rich gas while the environment is kept under reducing conditions by operating sub-stoichiometrically. The temperature of compartment 21 is maintained above the cracking temperature of coal tar, oils, hydrocarbons, etc. to crack these cancer causing compounds to result in a hydrogen rich cracked gas which is directed via conduit 104 to gas cleanup 12 for further treatment such as desulfurization to thus yield an ideal synthesis gas of $2H_2$ and 1CO. In the event that not

enough fuel exists in compartment 21 by virtue of using low volatile coal supplemental fuel maybe added with the oxygen in order to attain cracking temperatures. Cracking compartment 21 which serves to separate the rich gas from the hot char is also used to pretreat the raw rich gas by cracking the cancer causing liquids and hydrocarbons from the coal by means of elevated temperature in cracking compartment 21 through the injection of sufficient oxidant via ports 103 (shown in Figure 2) of lance 40 and combusting some of the volatile matter from the coal to yield a cracked gas which is devoid of coal liquids and hydrocarbons and whose composition is mainly H_2 and CO with H_2 being the dominant gas. Within compartment 21, radiant zone 107 provides efficient thermal energy transfer to the coal emerging from discharging end 35. The coal/char is pushed out of chamber 80 progressively in a pulsating mode in order to provide a fresh new face of coal/char which is heated frontally by radiation from compartment 21. Depending upon the coal used it is possible to obtain a cracked gas of $2H_2$ and 1CO from the process without the need for a shift converter which is known in the art. If inadequate volatile matter is contained in the coal, steam is added in order to increase the H_2 content of the gas. Subsequent to cleanup the synthesis gas thus produced, is comprised of the essential proportions of $2H_2$ to 1CO. This gas when cooled in heat exchanger 27 and directed to plant 28 via duct 105 is ideal for synthesizing it into a liquid. Plant 28 may be a Fischer Tropsch or a methanol plant which in turn may be followed by a methanol-to-gasoline train, such as the one developed by Mobil Oil. These processes for conversion of the synthesis gas to various liquids are known in the art and are not part of this invention. Since the major cost of making an alternate to petroleum liquid fuel from synthesis gas is the cost of producing the synthesis gas, the cracking of

the volatile matter of the coal as described herein, is an elegant and economical approach for making the feedstock for the sythesis plant(s).